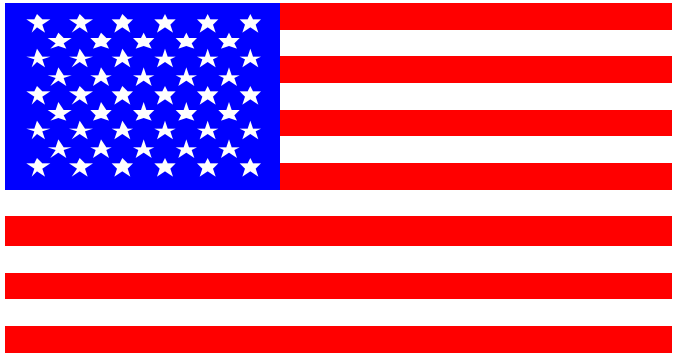
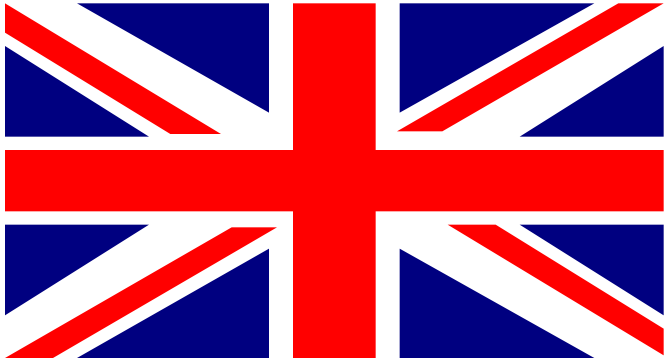
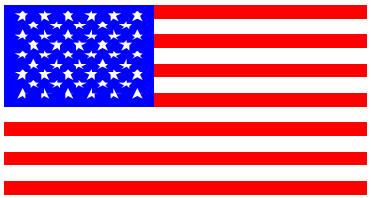
US/UK Command Decision Modeling Workshop

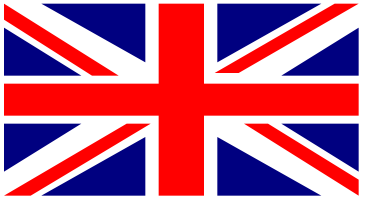




10-14 July 1995



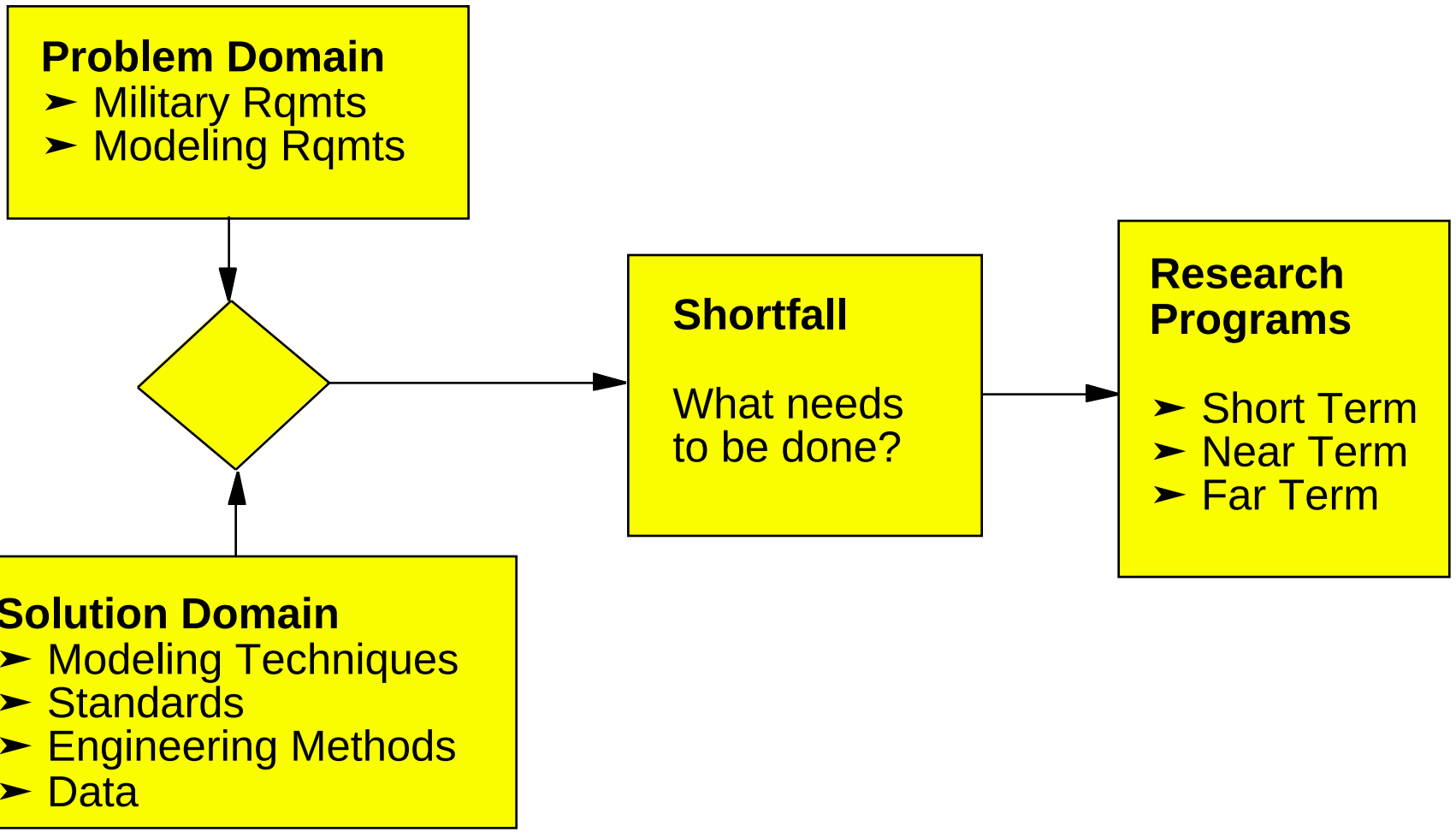
US/UK Command Decision Modeling Workshop 10-14 July 1995

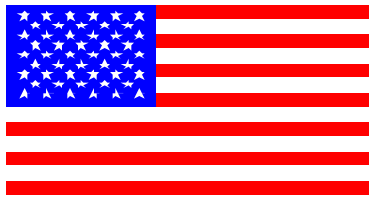


Aims of the Workshop

- To consider the requirements for modeling the command decision process.
- Recommend areas where further research is required.

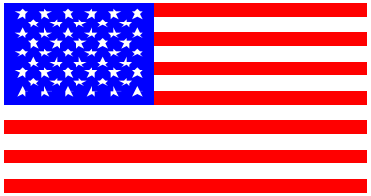
Workshop Process



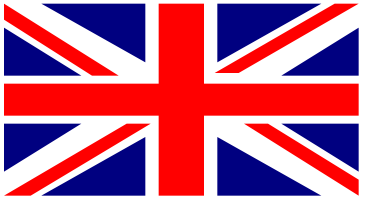


INSIGHTS

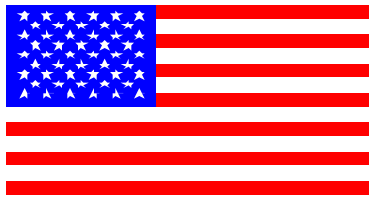
- "Stormin' Norman" Dilemma
- Timely Decisions
- Doctrine vs Reality
- Intuition vs Estimate
- On the back of every commander rides a logistician
- Variable resolution is crucial
- Summation of individual behavior ≠ collective behavior ≠ emergent behavior



INSIGHTS

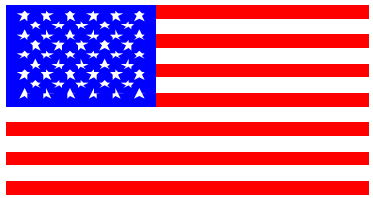


- The art of command requires inductive reasoning
- Information vs data
- Planning, monitoring, forecasting, and replanning
- The "right" tool for the job
- Common command process
- Command under catastrophic conditions
- System that knows something about the user



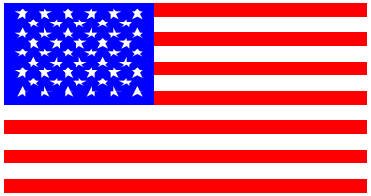
INSIGHTS

- HCI changes impact of success
- Validation of the interpretation
- Standards for openness
- No risk, no gain
- Lack of measures for cognitive skills
- Strategic view of data collection - HCI and command agents design
- Maintenance of knowledge

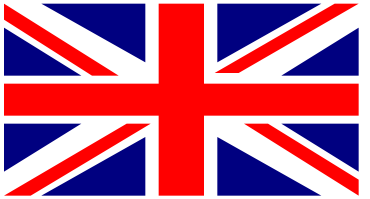


DERA Research Areas

- Human Computer Interface
- Historic perspective
- Stress modeling
- Architecture for multiple decision tools in the same simulation



US Research Efforts



- Command Agent Study
- Technology Review

Command Agent Study

- What is a command agent?
- What are the types/forms of decisions they make?
- Where are they?
- How/when do they interact?

A canonical definition of a command agent architecture.

Technology Review

PHASE I

- Current state-of-the-art in decision modeling.
- Human Computer Interface.
- Map technology to types of decisions.

PHASE II

- Testbed Environment
- Prototyping

Reasoning Standards

Simulation Production

Command Agent Study

- Examine command agent functions.
  - What decisions do they make?
  - When do they make the decision?
  - What inputs are used in their process?
- Categorize decision making into types.
  - assessment, prediction, ...
- Describe command agent interactions.
  - With the staff.
  - With other command agents.

Technology Review - Phase I

- Examine current state-of-the-art.

Theoretical

•• Expert systems
•• Neural networks
•• Adaptive Planning
•• Cellular automata
•• Colored petri-nets
•• Fuzzy logic
•• Genetic algorithms
•• Evolutionary programming

Applied

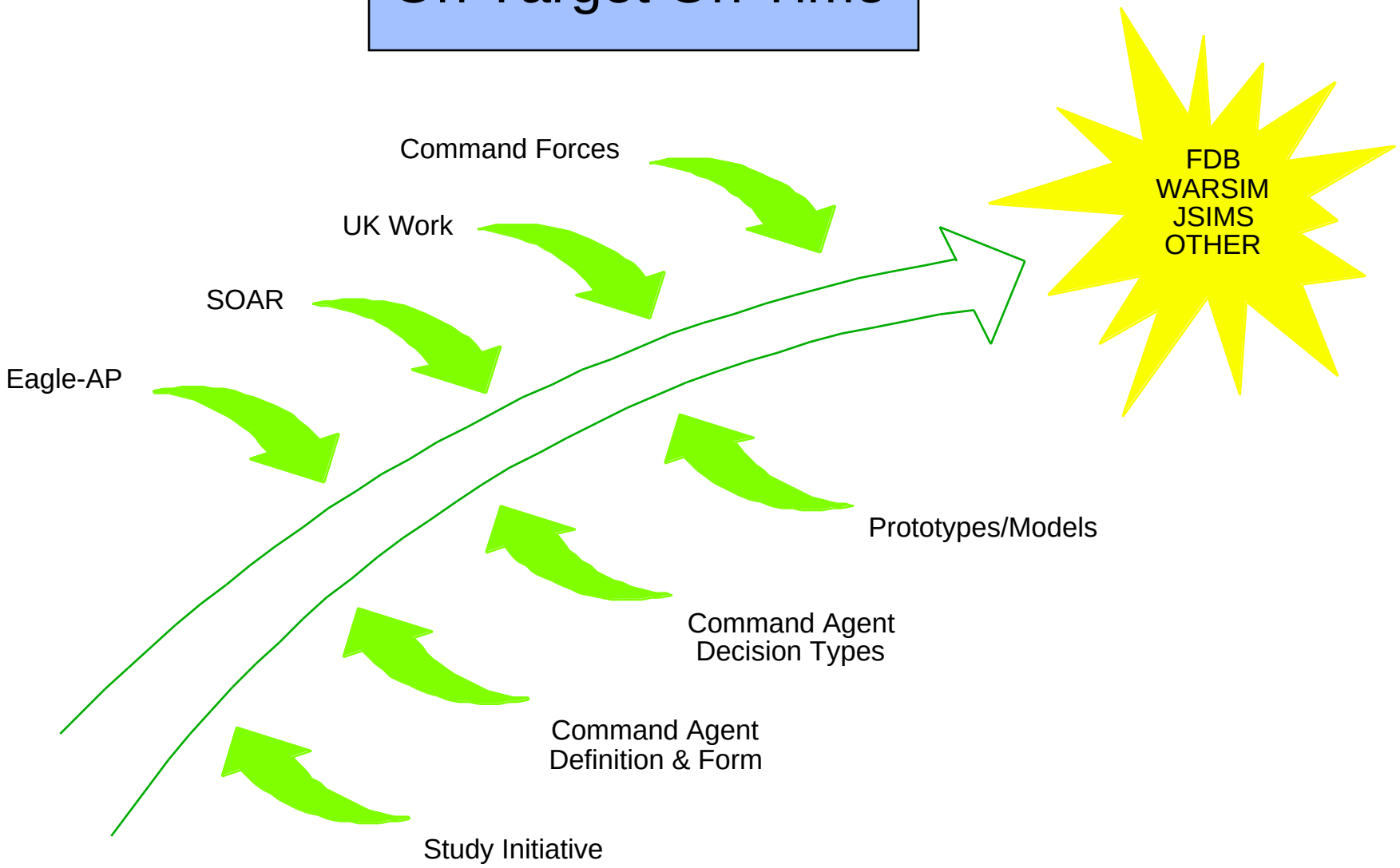
✓ CFOR
✓ Eagle-Adversarial Planner
✓ GeneKnoFlexE
✓ SOAR
✓ CCTT
✓ Fuzzy Tables
✓ Bounded Neural Nets

- Determine the types of decision problems best addressed by each technology.

Technology Review - Phase II

- Testbed environment
- Prototype/model the types of decisions using technology(s) determined in Phase I.
- Parallel in UK to facilitate the sharing of work.
- Examine use of Eagle-AP and GeneKnoFlexE.
- Feeds WARSIM Testbed, AI Center, DERA/UK etc.

On Target On Time



Players & Roles

NSC

- Management
- CD for future ADS
- WARSIM Testbed (Eagle-AP)
- WARSIM 2000
- Army M&S SCC for Reasoning
- FDB cognitive lead
- Link to CGSC for doctrinal process definition

AI Center

- Technology assessment lead

DUSA(OR)

- Study Sponsor
- Receive the products

DRA/UK

- HCI
- Historical perspective
- Stress modeling
- SOAR
- Paradigms in hosting multiple techiques

ARL

- Assist AI Center
- Independent assessment of technologies

DMSO

- Consumer of products
- Human behavior TWG

STRICOM

- WARSIM command decision processes
- FDB cognitive descriptions
- Evolutionary programming

MITRE

- Eagle-AP
- Technical expertise
- Canonical agent definition
- CFOR

IDA

- Study support
- Cognitive research

ARI

- Human factors
- CCF
- HCI

Threats Dir & NGIC

- Intelligence processing
- Threat data (OPFOR)
- WARSIM Testbed assessment
- GenKnoFlexE assessment
- Fuzzy tables/data sets
- Performance issues

SSDC

- Bounded neural networks

LANL

- Assist/expertise in canonical agent definition & TRM development
- Assist in prototype development
- Technical expertise

Briefed

- Defense Research Agency
  - 4 Sep 95 – Mr. Cox
- National Ground Intelligence Center
  - 8 Sep 95 – Ms. Morrow
- Battle Command Battle Lab
  - 12 Sep 95 - CPT McKinney
- Institude for Defense Analysis
  - 13 Sep 95 – Mr. Brooks
- Defense Modeling and Simulation Office
  - 13 Sep 95 – CAPT Hollenbach
- Pentagon AI Center
  - 14 Sep 95 – MAJ Payne
- DUSA(OR) [MISMA]
  - 14 Sep 95 – COL Hardin & Mr. Dunn
- ODISC4 Deputy Director
  - 14 Sep 95 – Mr. Borland

Timeline and Funding

- Concept Formulation – Aug 95 to Oct 95
- Architecture/TRM Design – Oct 95 to Jul 96
- Technology Review – Oct 95 to Jul 96
- Prototype(s) – Jul 96 to Dec 96

✓ Command Agent Study 200K

✓ Technology Review 200K